DOCUMENT RESUME

ED 222 543 TM 820 695

TITLE	Report of the 1981 Certificate in Computer Programming Examinations.
INSTITUTION	Institute for Certification of Computer Professionals, Chicago, IL.
SPONS AGENCY	Psychological Corp., New York, N.Y.
PUB DATE	Feb 82
NOTE	40p.; For related document, see TM 820 696.
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Certification; *Computer Science; Item Analysis; Occupational Tests; *Programing; *Systems Analysis; *Testing; Test Reliability; Test Validity
IDENTIFIERS	*Certificate in Computer Programming

ABSTRACT

The Certificate in Computer Programming (CCP) Examination is conducted by the Institute for Certification of Computer Professionals (ICCP) to identify qualified computer professionals in various spheres of computer technology. The CCP Examinations are focused on programming skills and are designed for recognition of competent senior-level programmers. The examination has four sections (general and three specializations: business, scientific, and systems). All three forms have the same general items, while each has its own specialization items. The fifth administration of CCP Examination (December 12, 1982) tested 455 candidates at 97 international test sites. The Business Programming Examination was taken by 277 candidates; the Scientific Programming Examination by 55 candidates; and the Systems Programming Examination by 123 candidates. Of the 455 candidates, 174 passed, for an overall pass rate of 38 percent. Of that 174, 106 (61 percent) took the Business Programming Examination; 13 (7 percent) took the Scientific Programming Examination; and 55 (32 percent) took the Systems Programming Examination. Examination administration, candidate characteristics, examination performance, demographic data, item difficulty and discrimination, reliability, and validity are discussed. (Author/PN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED222543

REPORT OF THE 1981

CERTIFICATE IN COMPUTER PROGRAMMING EXAMINATIONS

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R. D. Spaniol

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Prepared for the
Institute for Certification of Computer Professionals
February 1982

TM 820 655

THE PROFESSIONAL EXAMINATIONS DIVISION OF THE PSYCHOLOGICAL CORPORATION • NEW YORK •

THE PSYCHOLOGICAL CORPORATION • 757 THIRD AVENUE • NEW YORK, NEW YORK 10017

CONTENTS

	Page
List of Tables	ii
List of Figures	iii
Preface	iv
Abstract	v
Introduction	1
Examination Administration	2
Candidate Characteristics	2
Examination Performance	4
Demographic Data	6
Item Difficulty and Discrimination	6
Reliability	8
Validity	8
Toronto Candidates	11

LIST OF TABLES

		Page
1.	List of 1981 CCP Test Centers Showing Numbers of Candidates by Specialization	12
2.	Number and Percent of Candidates Taking Each 1981 CCP Examination in Relation to Demographic Factors	15
3.	Number and Percent of Candidates Taking, Passing, and Failing by Repeat Status on 1981 CCP Examinations	20
4.	Number and Percent of Candidates, Taking, Passing, and Failing by Repeat Status on 1978, 1979, and 1980 CCP Examinations	21
5.	Number and Percent of Candidates Taking, Passing, and Failing General and Specializations of 1981 CCP Examinations	22
6.	Basic Statistics for the 1981 CCP Examinations	23
7.	Performance of Candidates on Each Area of the 1981 CCP Examinations	24
8.	Performance of Candidates on the 1981 Business Programming Examination in Relation to Demographic Factors	25
9.	Performance of Candidates on the 1981 Scientific Programming Examination in Relation to Demographic Factors	27
10.	Performance of Candidates on the 1981 Systems Programming Examination in Relation to Demographic Factors	29
11.	Number of Items at Each Level of Difficulty in the 1981 CCP Examinations	31
12.	Number of Items at Each Level of Discrimination in the 1981 CCP Examinations	32

LIST OF FIGURES

	Page
Figure 1, Pass Rates for Five Years by Group	33

PREFACE

This report is the exclusive property of the Institute for Certification of Computer Professionals. Persons or organizations wishing to publish excerpts or material containing data extracted from it, must secure permission from the ICCP Executive Committee to do so. They are, however, cautioned regarding the hazards of taking material out of context, and also of reporting fragmentary data on which conclusions cannot be based. In any republication of data for sub-groups, data for the total group should also be reported to facilitate interpretation. It is also requested that any publication, reproduction, or other use of any material in this report acknowledge The Psychological Corporation as the source from which it was drawn.

ABSTRACT

The fifth administration of the Certificate in Computer Programming (CCP) Examination took place on December 12, 1981, when 455 candidates were tested at 97 testing centers around the world. The Business Programming Examination was taken by 277 candidates; the Scientific Programming Examination by 55 candidates; and the Systems Programming Examination by 123 candidates. Of the 455 candidates, 174 passed, for an overall pass rate of 38%. Of that 174, 106 (61%) took the Business Programming Examination; 13 (7%) took the Scientific Programming Examination; and 55 (32%) took the Systems Programming Examination.**

Three hundred and thirty-five candidates were taking a CCP examination for the first time: 40% of them passed. Twenty-seven candidates had previously taken a CCP examination and were now seeking certification in another specialty area: 44% of them passed. Finally, 84 candidates were repeating the CCP examination in the same specialization: 30% of them passed.

This report presents and discusses CCP examination data and relates them to candidate characteristics. Descriptive statistics are also reported for parts of the examinations.

**These summary figures include the Toronto, Canada test center and candidates. With the exception of data on testing centers, all other analyses were computed before the Toronto answer sheets were received at The Psychological Corporation; therefore the nine candidates from Toronto are excluded from these analyses and total numbers are slightly different. Information on the Toronto candidates is included in a separate section of this report.

Introduction

The Certificate in Computer Programming (CCP) is one of two programs conducted by the Institute for Certification of Computer Professionals (ICCP) to identify qualified computer professionals in various spheres of computer technology. The CCP Examinations are focused on programming skills and are designed for recognition of competent senior-level programmers.

The CCP Examinations have been developed in relation to the roles and functions of programmers working in various settings. The general knowledge required of programmers in most settings is tested by means of a General section, while the specialized knowledge required of programmers in business, scientific, and systems settings is tested by means of Specialization sections. To qualify for CCP status, candidates must attain passing scores in both the General section and one Specialization section during the same sitting.

The questions in the examinations are submitted by educators and practitioners throughout the computer industry. They are then developed in relation to the topics in the General and Specialization content outlines that appear in the CCP Examination Announcement and Study Guide. The original questions are edited by the professional staff of The Psychological Corporation to meet psychometric standards. Drafts of questions are reviewed by panels of expert programmers in each specialty area and representatives from the CCP Council. The reviews lead to approval, revision, or rejection of questions and to classification of questions in relation to the examination content outlines.

The Psychological Corporation compiles drafts of the examination's four sections (General and three Specializations) by selecting from the approved item pool the number of items specified by the CCP Council for each topic in the content outlines. The CCP Council reviews these drafts to ensure that each section adheres to specifications, that every item is current, appropriate, and technically accurate, and that the keyed responses are correct. When the drafts have been approved, the three examinations are compiled in their final form. Thus all three forms of the CCP Examinations -- Business, Scientific, and Systems -- have the same General items, while each has its own Specialization items. The Council establishes the passing scores for each examination, taking into account the difficulty of the items that have been included, the performance expected of a programmer at the certification level, and prior experience with the examinations.

Examination Administration

The 1981 CCP Examinations were administered to 455 candidates, a 12% decrease from the 519 people tested in 1980. A total of 97 test centers were used in the United States and abroad, eight more centers than were used for the 1980 examinations. Five states had four or more centers: Texas, 6; California and Pennsylvania, 5; New York and Ohio, 4. Ten states had two centers, while twenty-seven states had one center. Eight centers were located in Canada and nine in other foreign countries: Hong Kong, the Philippines, Indonesia, Ireland, France, West Germany, Singapore, New Zealand, and Saudi Arabia. These was one Sunday center, three special centers, and six centers for DANTES (Defense Activity for Non-Traditional Education Support).

The Washington, D.C. and New York, NY centers drew the largest number of candidates, 25, followed by Detroit with 21 and Dallas with 20. No other center had as many as twenty candidates. Eleven centers tested ten or more candidates. Thirty-four centers tested only a single candidate. The median testing center in 1981 was one at which two candidates were tested; that is, half of the centers tested two or more candidates and half tested either two or one. The average number of candidates at a center was 4.7.

Table 1 presents the list of test centers, with the number of candidates who took each of the three examinations at each center and the total number of candidates at each center. The centers are listed in descending order of the total number of candidates. At the end of the table, summary figures show that there were 97 test centers, 277 candidates who took the Business Programming Examination, 55 who took the Scientific Programming Examination, and 123 who took the Systems Programming Examination, for a total of 455 candidates.

Candidate Characteristics

Candidates supply demographic information as part of the application procedure. The numbers of candidates in each of the demographic categories who took each of the 1981 CCP Examinations are shown in Table 2.

As in every previous year, the typical candidate in all three groups was between 26 and 35 years of age, learned programming skills on the job, had 5-10 years' experience, worked in a service organization, held a staff-level position, and did not hold a Certificate in Data Processing (CDP). Again, most candidates held at least a bachelor's degree. Approximately one-fifth of the Business Pro-

gramming candidates, one-fourth of the Systems Programming candidates, and one-third of the Scientific Programming candidates also held a master's degree. The most frequent degree major for Business and Systems programmers was computer science, while the majority of Scientific programmers was evenly divided between engineering and mathematics majors.

No single work setting dominated. The largest single number of Business and Systems programmers worked in consulting organizations, while the largest single number of Scientific programmers worked in research engineering.

The job titles used by the majority of Business Programming candidates were Programmer Analyst, Business Programmer, Systems Analyst, and Consultant. Most Scientific Programming candidates used the job titles of Programmer Analyst, Scientific Programmer, Systems Analyst, and Applications Engineer. Systems Programming candidates most often used the job titles of Programmer Analyst, Systems Programmer, and Systems Analyst.

The pattern of professional affiliation among the candidates was similar to last year. The largest percentage (61%) of Business programmers had no professional affiliation; of those who were members of a professional organization, the majority belonged to either DPMA - Data Processing Management Association (20%), or ACM - Association for Computing Machinery (16%). The majority of Scientific programmers either had no professional affiliation (37%) or belonged to ACM (37%). In addition, 28% belonged to IEEE - Computer Society of the Institute of Electrical and Electronic Engineers. The largest percentage of Systems programmers (51%) belonged to ACM, while 40% had no professional affiliation and 21% belonged to IEEE.

The group with the largest number of CDP holders was the Scientific Programming candidates, with 33% holding the CDP. Business and Systems programmers were comparable to each other, with 16% and 18% respectively holding the CDP. These figures represent a change from 1980, when all three groups were comparable (20 - 23%) in numbers of CDP holders.

There were nine DANTES candidates, compared with seven in 1980. Three of them passed. Of the nine, four took the Business Programming Examination, three the Scientific Programming Examination, and two the Systems Programming Examination. Five were from the Army, two from the Navy, and two from the Air Force.

Three DANTES candidates held bachelor's degrees, three held master's degrees, and two held the doctorate.

Examination Performance

Table 3 shows the number and percentage of candidates by repeater status who took, passed, and failed each of the 1981 CCP Examinations. Of the total 446 people sitting for the examinations, 171 passed, for an overall pass rate of 38%. The 335 candidates taking the examination for the first time had a 40% pass rate. The 27 candidates who had taken one of the other CCP Examinations in a previous year had the highest pass rate (44%), while the 25 candidates who were repeating the same CCP Examination, having failed it in a previous year, had the lowest pass rate (30%). Thus candidates who have once failed the examination are more likely to fail it than first-time candidates, while candidates who have passed one form of the examination are more likely to pass another form than first-timers or repeaters.

The first-time candidates had pass rates of 37% in the Business Programming Examination, 25% in the Scientific Programming Examination, and 53% in the Systems Programming Examination; their pass rates in 1980 were 32%, 41%, and 59% respectively.

The overall pass rates were 38% for Business Programming, 22% for Scientific Programming, and 46% for Systems Programming. These overall pass rates are compared with the previous three years in Table 4. In addition, the overall rates for the five years of the Examinations are depicted in the bar graph in Figure 1. It may be seen that the pass rates have fluctuated rather widely over the five years of the Examinations, and only one overall trend is clearly apparent: the Systems Programming Examination has always had the highest pass rate, but demonstrates a steady decline from 75% in 1978 to 46% in 1981. The pass rate for Scientific Programming also shows relatively wide fluctuations, but at a much lower level, with a high of 41% in 1978 and a low of 13% in 1977. In comparison, the pass rate for Business Programming has tended to remain rather stable, varying only from a high of 42% in 1979 to a low of 24% in 1977.

Table 5 presents the pass rates of candidates for the General and Specialization sections of the three examinations. It shows that the Business programmers had the highest pass rate on the Specialization section (57%), while the

Scientific programmers had the lowest pass rate on their Specialization (26%). Scientific programmers had the lowest Specialization pass rates in 1979 and 1980, as well.

On the General section, Systems programmers had by far the highest pass rate (75%), while Business programmers had the lowest (44%). Systems programmers have also shown the highest pass rates on the General section in previous years.

Table 6 shows basic statistics for each of the CCP Examinations. The number of items in the General section was 178, roughly comparable to the 180 items in the 1980 examinations. The numbers of items in the Specialization sections were similar to the numbers in 1980.

In the General section, the highest score (172) was achieved by a Systems programmer, and the lowest (59) by a Business programmer. The General section highest mean score was achieved by Systems programmers and the lowest mean score by Business programmers. This is the same pattern that was demonstrated in the 1980 CCP Examinations.

Each of the Specialization sections is composed of completely different items; they are of different lengths, and they were taken by different candidates. Therefore, scores on them cannot be compared in the same way that scores on the General section can be compared. However, some comparison among the three groups can be made by standardizing the mean scores through converting them to mean percent scores. This conversion is accomplished by dividing the mean score by the total number of items in the section, yielding the mean percentage of correct content for each group. When this is done, the Systems programmers' mean score (40.94) is shown to be 71%, for the highest mean Specialization score. The Business programmers' mean score (39.59) converts to a mean percent of 69%, which is only slightly lower than the Systems programmers' score. Finally, the Scientific programmers' mean score (31.24) is 60%, which is the lowest mean Specialization score.

Table 7 shows the mean and standard deviation of the scores of each of the three groups of candidates on the five content areas of the General section (Data and File Organization; Principles and Techniques of Programming; Interaction with Hardware and Software; Interaction with People; and Associated Techniques) and on the Specialization sections. The Systems programmers had the

highest mean scores on all five content areas of the General section, as in previous years. The performance of the three groups was most similar in the area of Interaction with People and most different in the area of Principles and Techniques of Programming, also as in previous years.

Demographic Data

The mean scores of candidates in various demographic categories are shown in Table 8 for the Business Programming Examination, in Table 9 for the Scientific Programming Examination, and in Table 10 for the Systems Programming Examination.

In some previous years, there has been a tendency for scores to increase in relation to amount of education on both sections of all three examinations, although this tendency was not evident in 1980. For the 1980 examinations, while the Business and Scientific programmers demonstrated increased scores in relation to education, the Systems programmers showed exactly the opposite effect on both the General and Specialization sections.

In general, candidates with more years of experience tended to achieve higher scores, as did candidates who learned their skills on the job, held the CDP, and maintained affiliations with professional organizations.

Other relationships in Tables 8, 9, and 10 may be of interest to individual readers, but because of the small sizes of the groups in some of the cells, caution is suggested in drawing any inferences from the data.

Item Difficulty and Discrimination

A difficulty index and a discrimination index are computed for every item in the examinations. The difficulty index is the proportion of candidates who answer the item correctly. For example, if 75% of the candidates give the correct response to an item, the item has a difficulty index of .75.

The discrimination index is a coefficient of correlation between candidates' performance on the item and their performance on the entire examination. It shows how well the item differentiates between those who achieved high scores on the examination and those who achieved low scores.

The difficulty and discrimination indices serve a variety of purposes in the development, interpretation, and evaluation of certification examinations such as the CCP Examinations. Before the reports of examination results are

produced, the difficulty and discrimination indices of the items are carefully reviewed to assure that there were no problems with any of the items. For example, if an item showed a very low difficulty index, such as .15, The Psychological Corporation would want to check to be sure that the item had been correctly keyed. Similarly, if the discrimination index showed that candidates who scored high on the examination as a whole were getting an item wrong, staff of The Psychological Corporation would check to find out if there were something especially attractive about other response options to the item.

Item statistics can also guide the Council in reviewing and revising items for use in later forms of the examinations. Data on individual items used in the three different examinations at one time can provide information about differences among the three groups; data on items used in the same examination at different times provides information about differences within the same group over time. In addition, as certain information becomes more widely known, some information becomes superseded by new information and procedures, right answers become wrong and wrong answers become possible solutions to problems, the item statistics can help the Council in identifying these trends in the profession.

It should be noted here that, because the purpose of a certification examination is the recognition of those who have mastered certain knowledges, skills, and abilities, the Council is not concerned if some items are relatively easy and others somewhat more difficult. In some types of tests, a specific level of difficulty may be desirable or even essential, but this is not the case with a certification examination. In the same manner, the precise level of discrimination is not critical in a certification examination, because one is not concerned with comparisons among individuals, but rather with recognition of all who have attained the required level of competence.

Table 11 shows the number of items at each level of difficulty in the 1981 CCP Examinations. As in previous years, the Systems programmers found the questions in the General section easier than did the other two groups, with a higher average index and more items with difficulty indices above .90. The Business programmers found the questions in the General section the most difficult, with the lowest average index and fewer items with difficulty indices above .50.

The Systems programmers, also with the highest average index in the Specialization sections, found their Specialty questions easier than the other two groups, while the Scientific programmers, with the lowest average index, found the questions in their Specialization section the most difficult.

The range of the average difficulty indices was from .60 to .71, which is lower than the range in the 1980 examinations.

Table 12 shows the number of items at each level of difscrimination in the 1981 CCP Examinations. Forty-five percent of the test items on the three examinations had discrimination levels above .30.

Reliability

The reliability of a test refers to the consistency with which it measures what it is measuring. The reliability coefficient is a statistic that indicates the extent to which candidates' scores would be likely to remain in the same relative position with respect to each other if the same test were administered to them repeatedly: the higher the reliability coefficient, the more consistent the measurement. In reality, it is generally not feasible to administer another test to the candidates, but statistical techniques permit the computation of reliability coefficients from a single administration.

The reliability coefficients for the 1981 CCP Examinations were computed through the use of Kuder-Richardson Formula 21 and are reported in Table 6. The coefficients for the General section were .92 for the Business Programming Examination, .93 for the Scientific Programming Examination, and .92 for the Systems Programming Examination. These coefficients are very satisfactory for tests such as the CCP Examinations. The coefficients for the Specialization sections are .73 for the Business Programming Examination, .73 for the Scientific Programming Examination, and .80 for the Systems Programming Examination. It is to be expected that these coefficients would be lower, since reliability is a function of test length: the longer the test, the greater the reliability. Thus these shorter Specialization sections would be expected to have the lower reliability than the General section.

Validity

The validity of a test refers to the extent to which the test measures what

it is intended to measure. For tests of competence such as the CCP Examinations, the important type of validity is content validity.*

The content validity of a test is assured by the procedures of sound test development. First, the knowledges, skills, and abilities that are most critical and most frequently needed in the profession are specified. The test items are then generated to measure those knowledges, skills and abilities, thus relating the test itself to actual practice in the profession. It is this guarantee of the relevance of the certification examination to professional practice that is the method of content validity.

The methods of content validity are employed in the development and administration of the CCP Examinations. The examination specifications were initially based upon an analysis of the roles and functions of programmers in different settings; they define the knowledges and skills required of senior-level programmers. Thos specifications have been reviewed regularly by the CCP Council, and have been modified as needed to keep pace with the current state of computer technology. Through the weights assigned to the component parts of the specifications, the Council has indicated the relative importance and frequency of occurrence of the different components.

The test items were developed in relation to the topics in the content outline by competent members of the profession. After they were edited, the items were reviewed by panels of qualified professionals, including representatives of the CCP Council, as well as computer specialists from different geographic and employment settings. In these reviews, the panels determined that the content of each question was appropriate, that the questions were clear, that they were correctly keyed, that only one answer was correct, and that each question was properly coded in relation to the approved outline of content. Later, drafts of final examinations were reviewed by the CCP Council to assure that they represented a balanced sampling of the content outline, and to confirm that new developments in the field of computer sciences had not caused any questions to become outdated or ambiguous. Finally the Council established the passing score in terms of the number of questions to be answered correctly on

---

*For a more extensive report on types of test validity, refer to the 1981 CCP Examination Report.

each section, based on their review of the content and their expectations for senior-level computer programmers. That process also contributes to the content validity of the examinations. While some errors in the pass/fail decision are inevitable, establishment of the passing score in terms of evaluation of the content level judged to represent competence in the important knowledges, skills, and abilities is one way to hold such errors to a minimum. Then, in applying the established passing scores with complete objectivity, another component of validity is added. It is well known that subjective ratings result in biased and invalid evaluations, whereas objectivity obviates those sources of invalidity.

Through these various procedures, the Institute for the Certification of Computer Professionals can be confident that the CCP Examinations are valid measures of the content considered to be essential knowledge before candidates may use the letters CCP with their names.

Toronto Candidates

Due to problems with the mails, test answer sheets from the Toronto, Canada, test center were not received by The Psychological Corporation in time to be included in the machine scoring and summarization procedures. Therefore, there are nine candidates who were omitted from all analyses reported in this text. Answer sheets for these candidates were hand-scored when they were received, and results are reported here separately.

	Business	Scientific	Systems	Total
Took Examination	3	1	5	9
Passed General, Passed Specialization	1	1	1	3
Passed General, Failed Specialization	0	0	4	4
Failed General, Failed Specialization	2	0	0	2
Failed Examination	2	0	4	6
Passed Examination	1	1	1	3

	Business		Scientific		Systems	
	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.
Mean Scores	126.0	38.3	153.0	43.0	145.6	43.6

TABLE 1

LIST OF 1981 CCP TEST CENTERS SHOWING NUMBERS OF CANDIDATES BY SPECIALIZATION

Test Center	Business	Scientific	Systems	Total
Washington, DC	12	4	9	25
New York, NY	14	3	8	25
Detroit, MI	17	2	2	21
Dallas, TX	13	0	7	20
Chicago, IL	12	3	4	19
Los Angeles, CA	9	3	4	16
San Francisco, CA	7	0	8	15
E. Peoria, IL	13	0	2	15
Boston, MA	4	1	8	13
Baltimore, MD	7	0	4	11
Philadelphia, PA	9	0	1	10
Denver, CO	5	2	2	9
Carson, CA	7	2	0	9
Pittsburgh, PA	7	2	0	9
South Orange, NJ	4	1	4	9
Houston, TX	6	2	1	9
Tampa, FL	5	0	3	8
Hartford, CT	3	1	4	8
Seattle, WA	4	1	3	8
Miami, FL	5	0	2	7
Huntington, WV	7	0	0	7
Vancouver, BC, Canada	5	0	2	7
Cleveland, OH	4	0	2	6
Portland, OR	2	2	2	6
Rio Piedras, PR	6	0	0	6
San Antonio, TX	5	1	0	6
Anchorage, AK	5	0	0	5
St. Louis, MO	4	1	0	5
Tulsa, OK	3	0	2	5
Norfolk, VA	3	1	1	5
Atlanta, GA	3	0	1	4
Dayton, OH	2	0	2	4
Carlisle, PA (DANTES)	2	1	1	4
Kansas City, MO	2	1	1	4
Indianapolis, IN	2	2	0	4
San Diego, CA	0	1	3	4
Calgary, AB, Canada	0	0	4	4
Cincinnati, OH	3	0	1	4
Raleigh, NC	3	0	0	3
Albuquerque, NM	1	2	0	3
Providence, RI	2	1	0	3
Memphis, TN	1	1	1	3
Canyon, TX	2	0	1	3
Flint, MI	2	1	0	3
Little Rock, AR	2	0	1	3

TABLE 1 (CONT'D)

LIST OF 1981 CCP TEST CENTERS SHOWING NUMBERS OF CANDIDATES BY SPECIALIZATION

Test Center	Business	Scientific	Systems	Total
Wanchai, Hong Kong (Foreign)	2	0	1	3
Fairbanks, AK (Special)	0	2	0	2
Albany, NY	1	0	1	2
Richmond, VA	1	0	1	2
Amherst, NY	2	0	0	2
Minneapolis, MN	0	1	1	2
Wilkes-Barre, PA	2	0	0	2
Milwaukee, WI	1	1	0	2
Rochester, NY	2	0	0	2
Madison, WI	1	0	1	2
New York, NY (Sunday)	1	0	1	2
Honolulu, HI	2	0	0	2
Edmonton, AB, Canada	1	0	1	2
Montreal, PQ, Canada	0	0	2	2
St. John's, NF, Canada	2	0	0	2
Montgomery, AL	2	0	0	2
Omaha, NB	2	0	0	2
Middletown, PA	1	0	0	1
Des Moines, IA	1	0	0	1
Wichita, KS	1	0	0	1
Lubbock, TX	1	0	0	1
Louisville, KY	1	0	0	1
Salt Lake City, UT	1	0	0	1
New Orleans, LA	0	0	1	1
Portland, ME	0	0	1	1
Birmingham, AL	1	0	0	1
Davenport, IA (Special)	1	0	0	1
Oklahoma City, OK	1	0	0	1
Pensacola, FL (DANTES)	0	1	0	1
Sacramento, CA	1	0	0	1
Shreveport, LA	1	0	0	1
Austin, TX	0	1	0	1
Washington, DC (DANTES)	1	0	0	1
Clinton, MS	0	0	1	1
Seoul, Korea (DANTES)	0	0	1	1
Elgin AFB, FL (DANTES)	0	1	0	1
Halifax, NS, Canada	0	0	1	1
Bozeman, MT (Special)	0	1	0	1
Columbia, SC	0	1	0	1
Kent, OH	1	0	0	1
Winnipeg, MB, Canada	1	0	0	1
Manila, Philippines (Foreign)	0	0	1	1
Dublin, Ireland (Foreign)	1	0	0	1
Singapore (Foreign)	1	0	0	1
Paris, France (Foreign)	0	1	0	1

TABLE 1 (CONT'D)

LIST OF 1981 CCP TEST CENTERS SHOWING NUMBERS OF CANDIDATES BY SPECIALIZATION

Test Center	Business	Scientific	Systems	Total
Stuttgart, W. Germany (Foreign)	0	1	0	1
Nashville, TN	1	0	0	1
Jakarta, Indonesia (Foreign)	0	0	1	1
Auckland, New Zealand (Foreign)	0	1	0	1
Ridyadh, Saudi Arabia (Foreign)	0	0	1	1
Fort Greely, AR (DANTES)	1	0	0	1
Toronto, ON, Canada	3	1	5	9
Total 97	277	55	123	455

TABLE 2

NUMBER AND PERCENT OF CANDIDATES TAKING EACH 1981 CCP EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	Business				Scientific				Systems			
	No.	%	Pass	Fail	No.	%	Pass	Fail	No.	%	Pass	Fail
TOTAL GROUP	274	100	105	169	54	100	12	42	118	100	54	64
AGE												
20 and Under	1	0	0	1	1	2	0	1	1	1	0	1
21 - 25	40	15	13	27	4	7	0	4	20	17	5	15
26 - 35	172	63	76	96	27	50	5	22	68	58	35	33
36 and Over	58	21	15	43	21	39	7	14	29	25	14	15
EDUCATION LEVEL												
Some H.S.	0	0	0	0	0	0	0	0	1	1	1	0
H.S. Grad.	6	2	2	4	0	0	0	0	0	0	0	0
Some College	48	18	12	36	5	9	0	5	17	14	9	8
Jr. Coll. Grad.	29	11	7	22	2	4	0	2	3	3	1	2
Bachelor's	125	46	53	72	19	35	3	16	61	52	26	35
Master's	58	21	26	32	19	35	7	12	30	25	12	18
Doctorate	4	2	2	2	8	15	2	6	4	3	4	0
Other	4	2	3	1	1	2	0	1	1	1	1	0
DEGREE MAJOR												
Computer Sci.	57	21	24	33	9	17	2	7	42	36	18	24
Data. Process.	39	14	10	29	0	0	0	0	3	3	1	2
Accounting	18	7	7	11	0	0	0	0	1	1	0	1
Business	42	15	11	31	2	4	1	1	7	6	1	6
Education	6	2	2	4	1	2	0	1	0	0	0	0
Engineering	7	3	3	4	14	26	2	12	15	13	9	6
Liberal Arts	13	5	6	7	2	4	0	2	7	6	3	4
Mathematics	31	11	15	16	14	26	4	10	16	14	6	10
Sciences	11	4	5	6	3	6	1	2	7	6	6	1
Statistics	2	1	1	1	2	4	1	1	3	3	3	0
Other	11	4	5	6	4	7	1	3	4	3	0	4
LEARNED SKILLS												
High School	2	1	1	1	0	0	0	0	0	0	0	0
On the Job	153	56	64	89	34	63	6	28	77	65	36	41
Proprietary	4	2	2	2	0	0	0	0	0	0	0	0
Manufacturer	4	2	0	4	0	0	0	0	1	1	1	0
Military	6	2	0	6	2	4	1	1	4	3	2	2
Cont. Education	5	2	3	2	1	2	0	1	2	2	2	0
Jr. College	22	8	6	16	0	0	0	0	2	2	0	2
College	69	25	25	44	15	28	4	11	24	20	9	15
Other	8	3	4	4	2	4	1	1	7	6	3	4
YEARS EXPERIENCE												
1 or Less	11	4	4	7	1	2	0	1	4	3	2	2
2 Years	30	11	9	21	4	7	0	4	3	3	0	3
3 Years	33	12	15	18	2	4	0	2	14	12	4	10

TABLE 2 (CONT'D)

NUMBER AND PERCENT OF CANDIDATES TAKING EACH
1981 CCP EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	Business				Scientific				Systems			
	No.	%	Pass	Fail	No.	%	Pass	Fail	No.	%	Pass	Fail
YEARS EXPERIENCE (CONT'D)												
4 Years	16	6	3	13	3	6	2	1	11	9	3	8
5 - 10 Years	125	46	53	72	22	41	5	17	49	42	23	26
11+ Years	52	19	19	33	20	37	5	15	35	30	21	14
ORGANIZATION												
Insurance	28	10	12	16	4	7	1	3	4	3	2	2
EDP Services	25	9	11	14	5	9	1	4	16	14	6	10
Education	23	8	10	13	8	15	3	5	11	9	6	5
Government	19	7	8	11	7	13	2	5	10	9	6	4
Public Util.	10	4	4	6	0	0	0	0	4	3	0	4
Mining/Const.	2	1	0	2	0	0	0	0	0	0	0	0
Transportation	4	2	1	3	1	2	0	1	4	3	1	3
Consulting	57	21	24	33	8	15	0	8	20	17	11	9
Financial	19	7	5	14	4	7	1	3	9	8	2	7
Retail/Mktg.	11	4	5	6	0	0	0	0	0	0	0	0
Distribution	2	1	2	0	0	0	0	0	1	1	0	1
Resrch/Engin.	2	1	1	1	12	22	2	10	13	11	6	7
Other Non-Mfg.	5	2	3	2	0	0	0	0	2	2	0	2
Equipment	11	4	3	8	1	2	0	1	12	10	6	6
Electrical	2	1	0	2	0	0	0	0	0	0	0	0
Chemicals	3	1	2	1	0	0	0	0	0	0	0	0
Publishing	1	0	1	0	0	0	0	0	2	2	2	0
Food/Tobacco	5	2	3	2	1	2	1	0	0	0	0	0
Metals	1	0	0	1	0	0	0	0	2	2	2	0
Trans. Equip.	1	0	1	0	0	0	0	0	0	0	0	0
Petroleum	9	3	2	7	1	2	0	1	2	2	1	1
Paper	0	0	0	0	0	0	0	0	1	1	0	1
Textiles	3	1	0	3	0	0	0	0	0	0	0	0
Other Mfg.	23	8	6	17	0	0	0	0	3	3	3	0
ORGANIZATION GROUP												
Service	187	68	75	112	37	69	8	29	78	66	34	44
Nonmanufacturing	20	7	11	9	12	22	2	10	16	14	6	10
Manufacturing	36	13	12	24	3	6	1	2	19	16	11	8
Other	23	8	6	17	0	0	0	0	3	3	3	0
PRESENT POSITION												
Mgr. Operations	3	1	0	3	1	2	1	0	2	2	2	0
Mgr/Sup. D-P	10	4	6	4	1	2	1	0	6	5	2	4
Systems Mgr.	7	3	2	5	2	4	1	1	4	3	1	3
Prog. Mgr.	14	5	5	9	1	2	1	0	9	8	6	3
Educ. Admin.	1	0	0	1	0	0	0	0	0	0	0	0
Educator	18	7	9	9	4	7	2	2	3	3	2	1

TABLE 2 (CONT'D)

NUMBER AND PERCENT OF CANDIDATES TAKING EACH 1981 CCP EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	Business				Scientific				Systems			
	No.	%	Pass	Fail	No.	%	Pass	Fail	No.	%	Pass	Fail
PRESENT POSITION (CONT'D)												
Consultant	31	11	16	15	1	2	1	0	13	11	8	5
Applic. Engin.	12	4	6	6	7	13	1	6	6	5	2	4
Sales Rep.	2	1	0	2	3	6	1	2	3	3	2	1
Systems Analyst	34	12	13	21	7	13	2	5	18	15	7	11
Opr. Research	0	0	0	0	0	0	0	0	0	0	0	0
Accounting	4	2	0	4	0	0	0	0	0	0	0	0
Bus. Prog.	51	19	14	37	1	2	0	1	3	3	0	3
Sci. Prog.	0	0	0	0	7	13	0	7	2	2	0	2
Sys. Prog.	5	2	3	2	1	2	0	1	18	15	7	11
Prog. Anal.	65	24	25	40	7	13	0	7	20	17	10	10
Engineering	0	0	0	0	5	9	1	4	4	3	3	1
Other	9	3	5	4	4	7	0	4	4	3	2	2
JOB LEVEL												
Senior Mgmt.	11	4	3	8	11	20	4	7	12	10	7	5
Middle Mgmt.	87	32	41	46	13	24	6	7	37	31	21	16
Staff	159	58	55	104	19	35	0	19	58	49	21	37
Line	0	0	0	0	5	9	1	4	4	3	3	1
STATE OF RESIDENCE												
Alabama	2	1	0	2	1	2	0	1	0	0	0	0
Alaska	6	2	1	5	2	4	0	2	0	0	0	0
Arkansas	2	1	1	1	0	0	0	0	1	1	0	1
California	24	9	9	15	7	13	1	6	16	14	7	9
Colorado	5	2	1	4	1	2	0	1	2	2	1	1
Connecticut	3	1	2	1	2	4	1	1	5	4	3	2
Dist. of Columbia	1	0	0	1	1	2	0	1	1	1	0	1
Florida	11	4	5	6	1	2	0	1	5	4	3	2
Georgia	3	1	2	1	0	0	0	0	1	1	1	0
Hawaii	2	1	1	1	0	0	0	0	0	0	0	0
Illinois	27	10	11	16	3	6	1	2	6	5	2	4
Indiana	2	1	2	0	2	4	0	2	0	0	0	0
Iowa	1	0	0	1	0	0	0	0	0	0	0	0
Kansas	2	1	1	1	0	0	0	0	1	1	0	1
Kentucky	1	0	0	1	0	0	0	0	0	0	0	0
Maine	0	0	0	0	0	0	0	0	1	1	1	0
Maryland	15	6	8	7	1	2	1	0	8	7	3	5
Massachusetts	7	3	3	4	1	2	0	1	8	7	4	4
Michigan	18	7	5	13	3	6	1	2	2	2	1	1
Minnesota	0	0	0	0	1	2	1	0	1	1	1	0
Mississippi	0	0	0	0	0	0	0	0	2	2	1	1
Missouri	3	1	2	1	2	4	0	2	0	0	0	0
Montana	0	0	0	0	1	2	1	0	0	0	0	0
Nebraska	1	0	1	0	0	0	0	0	0	0	0	0

TABLE 2 (CONT'D)

NUMBER AND PERCENT OF CANDIDATES TAKING EACH
1981 CCP EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	Business				Scientific				Systems			
	No.	%	Pass	Fail	No.	%	Pass	Fail	No.	%	Pass	Fail
STATE OF RESIDENCE (CONT'D)												
New Jersey	9	3	4	5	2	4	0	2	5	4	4	1
New Mexico	1	0	0	1	1	2	0	1	0	0	0	0
New York	16	6	5	11	1	2	0	1	8	7	2	6
North Carolina	3	1	1	2	0	0	0	0	0	0	0	0
Ohio	11	4	5	6	0	0	0	0	5	4	1	4
Oklahoma	4	2	2	2	0	0	0	0	2	2	0	2
Oregon	2	1	1	1	2	4	0	2	2	2	1	1
Pennsylvania	18	7	6	12	3	6	1	2	2	2	2	0
Puerto Rico	6	2	2	4	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	1	2	1	0	0	0	0	0
South Carolina	2	1	0	2	1	2	0	1	0	0	0	0
Tennessee	1	0	0	1	0	0	0	0	1	1	0	1
Texas	28	10	10	18	5	9	0	5	9	8	5	4
Utah	1	0	0	1	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0	1	1	1	0
Virginia	8	3	4	4	3	6	1	2	6	5	3	3
Washington	4	2	0	4	1	2	1	0	3	3	0	3
West Virginia	7	3	1	6	0	0	0	0	0	0	0	0
Wisconsin	3	1	1	2	1	2	0	1	1	1	1	0
Wyoming	0	0	0	0	1	2	0	1	0	0	0	0
Alberta	1	0	1	0	0	0	0	0	5	4	3	2
British Columbia	5	2	3	2	0	0	0	0	2	2	0	2
Manitoba	1	0	1	0	0	0	0	0	0	0	0	0
Newfoundland	2	1	0	2	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	0	0	0	0	0	1	1	1	0
Ontario	0	0	0	0	0	0	0	0	1	1	1	0
Foreign	4	2	3	1	2	4	1	1	4	3	1	3
PROF. AFFILIATION												
None	167	61	63	104	20	37	2	18	47	40	18	29
ACM	44	16	26	18	20	37	8	12	60	51	34	26
ACPA	5	2	1	4	1	2	0	1	3	3	2	1
AEDS	4	2	2	2	1	2	0	1	0	0	0	0
AICPA	4	2	2	2	2	4	0	2	1	1	0	1
AMA	8	3	6	2	2	4	1	1	3	3	1	2
AIA	0	0	0	0	0	0	0	0	1	1	0	1
ASM	5	2	2	3	2	4	0	2	1	1	0	1
CIPS	3	1	2	1	0	0	0	0	1	1	1	0
DPMA	55	20	13	42	9	17	3	6	10	9	3	7
IEEE	12	4	6	6	15	28	4	11	25	21	15	10
WAA	3	1	0	3	2	4	0	2	0	0	0	0
ORSA	0	0	0	0	0	0	0	0	0	0	0	0
SCDP	5	2	2	3	2	4	0	2	2	2	1	1
TIMS	1	0	1	0	0	0	0	0	0	0	0	0

TABLE 2 (CONT'D)

NUMBER AND PERCENT OF CANDIDATES TAKING EACH
1981 CCP EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	Business				Scientific				Systems			
	No.	%	Pass	Fail	No.	%	Pass	Fail	No.	%	Pass	Fail
CDP STATUS												
CDP Holder	43	16	20	23	18	33	5	13	21	18	11	10
Non-Holder	231	84	85	146	36	67	7	29	97	82	43	54
DANTES-SERVICE												
Army	3	1	0	3	1	2	1	0	1	1	1	0
Navy	0	0	0	0	1	2	0	1	1	1	0	1
Air Force	1	0	1	0	1	2	0	1	0	0	0	0
DANTES-ED. LEVEL												
H.S. Grad.	0	0	0	0	0	0	0	0	0	0	0	0
Some College	1	0	0	1	0	0	0	0	0	0	0	0
Bachelor's	2	1	1	1	0	0	0	0	1	1	0	1
Master's	1	0	0	1	2	4	1	1	0	0	0	0
Doctorate	0	0	0	0	1	2	0	1	1	1	1	0
DANTES-YEARS EXP.												
2 Years	0	0	0	0	0	0	0	0	0	0	0	0
3 Years	1	0	0	1	0	0	0	0	0	0	0	0
4 Years	0	0	0	0	1	2	1	0	0	0	0	0
5 - 10 Years	2	1	1	1	1	2	0	1	1	1	0	1
11+ Years	1	0	0	1	1	2	0	1	0	0	0	0

TABLE 3

NUMBER AND PERCENT OF CANDIDATES TAKING, PASSING, AND FAILING BY REPEAT STATUS ON 1981 CCP EXAMINATIONS

	Business		Scientific		Systems		Total	
	No.	%	No.	%	No.	%	No.	%
First Time CCP								
Took	212	100	36	100	87	100	335	100
Passed	79	37	9	25	46	53	134	40
Failed	133	63	27	75	41	47	201	60
First Time This Area (Took Other Area)								
Took	8	100	7	100	12	100	27	100
Passed	5	63	2	29	5	42	12	44
Failed	3	37	5	71	7	58	15	56
Repeat This Area								
Took	54	100	11	100	19	100	84	100
Passed	21	39	1	9	3	16	25	30
Failed	33	61	10	91	16	84	59	70
Total CCP This Area								
Took	274	100	54	100	118	100	446	100
Passed	105	38	12	22	54	46	171	38
Failed	169	62	42	78	64	54	275	62

TABLE 4

NUMBER AND PERCENT OF CANDIDATES TAKING, PASSING, AND FAILING BY REPEAT STATUS ON 1978, 1979, AND 1980 CCP EXAMINATIONS

	Business						Scientific						Systems						Total					
	1978		1979		1980		1978		1979		1980		1978		1979		1980		1978		1979		1980	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
First Time CCP																								
Took	218	100	227	100	271	100	31	100	44	100	46	100	100	100	104	100	101	100	349	100	375	100	418	100
Passed	72	33	94	41	86	32	12	39	14	32	19	41	74	74	77	74	60	59	158	45	185	49	165	39
Failed	146	67	133	59	185	68	19	61	30	68	27	59	26	26	27	26	41	41	191	55	190	51	253	61
First Time This Area (Took Other Area)																								
Took	3	100	2	100	7	100	2	100	1	100	6	100	7	100	9	100	9	100	12	100	12	100	22	100
Passed	2	67	1	50	5	71	0	0	1	100	3	50	4	57	6	67	6	67	6	50	8	67	14	64
Failed	1	33	1	50	2	29	2	100	0	0	3	50	3	43	3	33	3	33	6	50	4	33	8	36
Repeat This Area																								
Took	34	100	43	100	56	100	4	100	10	100	9	100	19	100	11	100	14	100	57	100	64	100	79	100
Passed	17	50	20	47	17	30	3	75	0	0	3	33	16	84	4	36	3	21	36	63	24	38	23	29
Failed	17	50	23	53	39	70	1	25	10	100	6	67	3	16	7	64	11	79	21	37	40	62	56	71
Total CCP This Area																								
Took	255	100	272	100	334	100	37	100	55	100	61	100	126	100	124	100	124	100	418	100	451	100	519	100
Passed	91	36	115	42	108	32	15	41	15	27	25	41	94	75	87	70	69	56	200	48	217	48	202	39
Failed	164	64	157	58	226	68	22	59	40	73	36	59	32	25	37	30	55	44	218	52	234	52	317	61

TABLE 5

NUMBER AND PERCENT OF CANDIDATES TAKING, PASSING, AND FAILING GENERAL AND SPECIALIZATIONS OF 1981 CCP EXAMINATIONS

	Business		Scientific		Systems		Total	
	No.	%	No.	%	No.	%	No.	%
Took Examination	274	100.0	54	100.0	118	100.0	446	100.0
Passed General, Passed Specialization	105	38.3	12	22.2	54	45.8	171	38.3
Passed General, Failed Specialization	16	5.8	19	35.2	35	29.7	70	15.7
Failed General, Passed Specialization	52	19.0	2	3.7	1	0.8	55	12.3
Failed General, Failed Specialization	101	36.9	21	38.9	28	23.7	150	33.6
Passed General	121	44.2	31	57.4	89	75.4	241	54.0
Passed Specialization	157	57.3	14	25.9	55	46.6	226	50.7
Failed General	153	55.8	23	42.6	29	24.6	205	46.0
Failed Specialization	117	42.7	40	74.1	63	53.4	220	49.3
Passed Examination	105	38.3	12	22.2	54	45.8	171	38.3
Failed Examination	169	61.7	42	77.8	64	54.2	275	61.7

TABLE 6

BASIC STATISTICS FOR THE 1981 CCP EXAMINATIONS

	(N = 274) Business		(N = 54) Scientific		(N = 118) Systems	
	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.
Maximum possible	178	57	178	52	178	58
Highest Score	165	54	167	46	172	55
Lowest Score	59	12	77	17	74	19
Passing Score	126	40	126	36	126	43
Median	122	40	130	30	140	41
Mean	120.75	39.59	127.06	31.24	139.42	40.94
Standard Deviation	20.85	6.60	21.69	6.70	18.55	7.51
K-R_{21} Reliability Coefficient	.92	.73	.93	.73	.92	.80

TABLE 7

PERFORMANCE OF CANDIDATES ON EACH AREA OF THE 1981 CCP EXAMINATIONS

	Business Programming	Scientific Programming	Systems Programming
Data/File Organization			
Mean	22.21	21.96	24.49
S.D.	4.13	4.80	4.28
Max. Possible	34	34	34
Principles/Techniques			
Mean	40.52	44.59	50.40
S.D.	9.35	9.43	7.90
Max. Possible	64	64	64
Hardware/Software			
Mean	26.68	28.11	31.37
S.D.	5.49	5.12	3.75
Max. Possible	37	37	37
Interaction with People			
Mean	22.98	22.76	23.23
S.D.	2.84	2.94	2.99
Max. Possible	28	28	28
Associated Techniques			
Mean	8.35	9.63	9.92
S.D.	2.53	2.63	2.31
Max. Possible	15	15	15
General Total			
Mean	120.75	127.06	139.42
S.D.	20.85	21.69	18.55
Max. Possible	178	178	178
Specialization			
Mean	39.59	31.24	40.94
S.D.	6.60	6.70	7.51
Max. Possible	57	52	58

TABLE 8

PERFORMANCE OF CANDIDATES ON THE 1981 BUSINESS PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
TOTAL GROUP	274	100	120.75	39.59
AGE				
21 - 25	40	15	116.50	37.52
26 - 35	172	63	122.52	40.45
36 and Over	58	21	119.07	38.53
EDUCATION LEVEL				
Some College	48	18	116.27	37.73
Jr. Coll. Grad.	29	11	115.76	38.79
Bachelor's	125	46	121.50	40.10
Master's	58	21	125.41	40.36
DEGREE MAJOR				
Computer Science	57	21	123.37	39.30
Data Process.	39	14	116.62	39.92
Accounting	18	7	121.00	41.06
Business	42	15	111.02	38.07
Engineering	7	3	127.43	40.86
Liberal Arts	13	5	123.38	39.92
Mathematics	31	11	128.16	41.10
Sciences	11	4	130.00	40.73
Other	11	4	117.45	38.45
LEARNED SKILLS				
On the Job	153	56	121.75	39.79
Jr. College	22	8	117.45	39.73
College	69	25	119.07	38.45
YEARS EXPERIENCE				
1 or Less	11	4	117.64	39.18
2 Years	30	11	117.03	38.73
3 Years	33	12	116.85	37.39
4 Years	16	6	111.75	37.31
5 - 10 Years	125	46	123.76	40.75
11+ Years	52	19	122.12	39.73
ORGANIZATION				
Insurance	28	10	122.68	39.68
EDP Services	25	9	124.72	40.60
Education	23	8	121.70	39.30
Government	19	7	126.37	41.00

TABLE 8 (CONT'D)

PERFORMANCE OF CANDIDATES ON THE 1981 BUSINESS PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
ORGANIZATION (CONT'D)				
Public Util.	10	4	122.30	41.00
Consulting	57	21	119.96	39.81
Financial	19	7	119.84	39.32
Retail/Mktg.	11	4	124.45	38.36
Equipment	11	4	123.18	40.64
Other Mfg.	23	8	112.35	36.70
ORGANIZATION GROUP				
Service	187	68	121.97	39.88
Nonmanufacturing	20	7	126.30	39.95
Manufacturing	36	13	118.56	40.33
Other	23	8	112.35	36.70
PRESENT POSITION				
Mgr/Sup. D-P	10	4	122.60	39.40
Prog. Mgr.	14	5	126.00	40.36
Educator	18	7	124.67	40.33
Consultant	31	11	124.68	41.52
Applic. Engin.	12	4	125.08	41.17
Sys. Analyst	34	12	123.68	41.06
Bus. Prog.	51	19	112.78	37.94
Prog. Anal.	65	24	122.72	39.31
JOB LEVEL				
Senior Mgmt.	11	4	119.82	39.18
Middle Mgmt.	87	32	124.11	40.68
Staff	159	58	119.38	39.19
PROF. AFFILIATION				
None	167	61	119.26	39.29
ACM	44	16	131.41	41.23
DPMA	55	20	115.89	39.00
IEEE	12	4	132.00	41.08
CDP STATUS				
CDP Holder	43	16	130.07	42.30
Non-Holder	231	84	119.01	39.08

TABLE 9

PERFORMANCE OF CANDIDATES ON THE 1981 SCIENTIFIC PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
TOTAL GROUP	54	100	127.06	31.24
AGE				
26 - 35	27	50	126.37	30.41
36 and Over	21	39	132.86	33.71
EDUCATION LEVEL				
Bachelor's	19	35	122.89	29.63
Master's	19	35	130.11	33.16
DEGREE MAJOR				
Computer Sci.	9	17	122.22	30.33
Engineering	14	26	121.00	31.07
Mathematics	14	26	121.07	30.00
LEARNED SKILLS				
On the Job	34	63	128.56	31.35
College	15	28	122.40	30.00
YEARS EXPERIENCE				
5 - 10 Years	22	41	126.00	30.91
11+ Years	20	37	132.80	33.10
ORGANIZATION				
Education	8	15	123.38	31.75
Consulting	8	15	116.25	26.25
Research/Engin.	12	22	133.33	32.58
Government	7	13	126.71	32.57
ORGANIZATION GROUP				
Service	37	69	124.24	30.54
Nonmanufacturing	12	22	133.33	32.58
PRESENT POSITION				
Applic. Engin.	7	13	138.14	28.14
Prog. Anal.	7	13	121.43	29.29
Sys. Anal.	7	13	133.57	33.71
Sci. Prog.	7	13	111.71	27.71
Engineering	5	9	134.00	34.80
JOB LEVEL				
Senior Mgmt.	11	20	137.55	32.27
Middle Mgmt.	13	24	140.92	35.62
Staff	19	35	115.42	28.26

TABLE 9 (CONT'D)

PERFORMANCE OF CANDIDATES ON THE 1981 SCIENTIFIC PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
PROF. AFFILIATION				
None	20	37	121.40	29.45
ACM	20	37	131.00	33.80
DPMA	9	17	137.00	32.78
IEEE	15	28	127.93	31.13
CDP STATUS				
CDP Holder	18	33	140.33	33.50
Non-Holder	36	67	120.42	30.11

TABLE 10

PERFORMANCE OF CANDIDATES ON THE 1981 SYSTEMS PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
TOTAL GROUP	118	100	139.42	40.94
AGE				
21 - 25	20	17	133.90	38.45
26 - 35	68	58	140.84	41.63
36 and Over	29	25	140.69	41.41
EDUCATION LEVEL				
Some College	17	14	141.53	42.59
Bachelor's	61	52	140.26	40.95
Master's	30	25	133.87	38.97
DEGREE MAJOR				
Computer Sci.	42	36	133.40	39.45
Engineering	15	13	143.60	43.33
Mathematics	16	14	142.69	41.38
LEARNED SKILLS				
On the Job	77	65	139.82	40.99
College	24	20	135.96	40.46
YEARS EXPERIENCE				
3 Years	14	12	132.07	38.07
4 Years	11	9	129.91	37.27
5 - 10 Years	49	42	139.06	40.73
11+ Years	35	30	148.54	44.66
ORGANIZATION				
EDP SERVICES	16	14	132.13	38.56
Education	11	9	148.00	44.09
Government	10	9	147.70	43.20
Consulting	20	17	141.45	41.85
Financial	9	8	133.00	36.89
Resrch/Engin.	13	11	131.31	40.31
Equipment	12	10	145.75	42.50
ORGANIZATION GROUP				
Service	78	66	139.91	40.67
Nonmanufacturing	16	14	129.13	38.75
Manufacturing	19	16	146.68	43.11

TABLE 10 (CONT'D)

PERFORMANCE OF CANDIDATES ON THE 1981 SYSTEMS PROGRAMMING EXAMINATION IN RELATION TO DEMOGRAPHIC FACTORS

Category	No.	%	General Mean	Specialization Mean
PRESENT POSITION				
Prog. Mgr.	9	8	146.22	43.00
Consultant	13	11	146.92	44.08
Sys. Analyst	18	15	134.72	39.11
Sys. Prog.	18	15	139.00	39.17
Prog. Anal.	20	17	134.20	40.50
JOB LEVEL				
Senior Mgmt.	12	10	151.50	44.42
Middle Mgmt.	37	31	145.27	42.89
Staff	58	49	133.91	38.79
PROF. AFFILIATION				
None	47	40	134.70	38.55
ACM	60	51	144.65	43.50
DPMA	10	9	147.40	41.60
IEEE	25	21	143.92	44.00
CDP STATUS				
CDP Holder	21	18	149.38	42.62
Non-Holder	97	82	137.26	40.58

TABLE 11

NUMBER OF ITEMS AT EACH LEVEL OF DIFFICULTY IN THE 1981 CCP EXAMINATIONS

Difficulty Index	Business		Scientific		Systems	
	General	Spec.	General	Spec.	General	Spec.
.91 - 1.00	21	12	24	7	48	6
.81 - .90	38	8	40	6	51	14
.71 - .80	40	12	40	5	29	11
.61 - .70	19	8	24	8	25	13
.51 - .60	20	5	25	9	16	8
.41 - .50	22	8	14	6	4	4
.31 - .40	13	3	7	7	2	0
.21 - .30	3	0	2	3	3	2
.11 - .20	2	1	2	0	0	0
.01 - .10	0	0	0	1	0	0
Average Index	.68	.69	.71	.60	.78	.71
No. of Items	178	57	178	52	178	58

TABLE 12

NUMBER OF ITEMS AT EACH LEVEL OF
DISCRIMINATION IN THE 1981 CCP EXAMINATIONS

Discrimination Index	Business		Scientific		Systems	
	General	Spec.	General	Spec.	General	Spec.
.61 - .70	0	0	5	0	1	0
.51 - .60	1	0	17	3	6	4
.41 - .50	26	2	32	8	27	12
.31 - .40	46	11	44	12	45	15
.21 - .30	55	27	25	8	57	15
.11 - .20	35	13	28	11	30	5
.01 - .10	14	3	10	7	9	6
.0 and below	1	1	17	3	3	1
No. of Items	178	57	178	52	178	58